

## **UMBRELLA WITH COOLING MISTING SCREEN**

### **Technical Field**

[0001] The disclosure relates generally to umbrellas. More particularly, the disclosure relates to patio umbrellas.

### **Background**

[0002] At outdoor social gatherings in a hot climate, guests often sit under an umbrella for protection from the sun. Despite avoiding direct exposure to the sun, however, such guests can still be subjected to high ambient temperatures. Some conventional umbrellas attempt to address this issue by providing a cooling mist to the guests. For example, some such umbrellas create a mist under the umbrella, which causes persons sitting under the umbrella to become wet. This effect may distract guests at social gatherings from conversation and may make them uncomfortable. Other conventional umbrellas provide a curtain of mist that separates the guests from the hot ambient environment while providing a cooling effect.

[0003] While permanent or semi-permanent structures such as large tent canopies can easily be adapted to include plumbing at the perimeter to create a curtain of mist, it is much more difficult to create such a structure that is easily and compactly stored, brought out of storage for a social occasion and placed on a patio table, and then removed following the occasion for compact storage once again.

[0004] As a particular example of a conventional umbrella, U.S. Patent No. 5,143,107 to Kelley (the '107 patent) entitled, RAINING UMBRELLA, discloses an outdoor play toy umbrella that is designed to create "rain" beneath the umbrella, thus drenching everyone sitting under the umbrella. Such an umbrella is not normally suited for outdoor social gatherings. The umbrella of the '107 patent does not fold for compact storage.

[0005] Similarly, U.S. Patent No. 6,017,188 to Benton (the '188 patent) is entitled, PATIO TABLE AND POLE FAN COMBINATION. The umbrella disclosed in the '188 patent incorporates both a fan and a misting device on the

underside of the umbrella. As with the umbrella disclosed in the '107 patent, the umbrella disclosed in the '188 patent causes guests to become wet. Furthermore, the '188 patent umbrella does not fold for compact storage.

[0006] U.S. Patent No. 5,979,793 to Louis (the '793 patent) entitled, SELF-CONTAINED MISTING DEVICE, discloses a misting device that sprays mist on guests sitting under an umbrella, thus causing them to become wet. The misting device disclosed in the '793 patent includes a base housing that contains water to be misted. The misting device is fitted with wheels and is transportable, but the bulk of the base makes compact storage difficult, if not impossible. U.S. Design Patent Nos. 416,073 and 422,051, also issued to Louis, disclose similar misting devices having reservoir bases of different shapes.

[0007] U.S. Patent No. 6,298,866 to Molnar (the '866 patent) entitled, TABLE UMBRELLA APPARATUS, discloses a sturdily built umbrella with a substantial structure including a cooling fan under the umbrella and misting nozzles that spray a mist on persons sitting under the umbrella. Accordingly, such persons become wet. In addition, the umbrella disclosed in the '866 patent cannot be folded for compact storage.

[0008] U.S. Patent No. 5,299,588 to MacLeod (the '588 patent) entitled, FLOATABLE SUNSHADE UMBRELLA, discloses an umbrella that incorporates a hollow pole shank with a spout centered at the top of the umbrella. The spout sprays water over the umbrella and surrounding area. As a result, no curtain of mist is formed. Further, the umbrella support structure disclosed in the '588 patent is rigidly constructed and does not fold for storage.

[0009] U.S. Patent No. 6,161,771 to Henry (the '771 patent) entitled, WATER FOUNTAIN SYSTEM AND METHOD, discloses a water fountain system that employs many configurations, some with umbrella-like roofs, all incorporating fountain sprays to provide a participatory water attraction. The system does not fold for storage and preferably is permanently installed, such as at an amusement park.

[0010] U.S. Patent No. 5,000,384 to Arnold (the '384 patent) is entitled, WATER MISTING APPARATUS FOR A CHAIR. The '384 patent discloses a

domed umbrella that secures to a sunning lounge chair. Nozzles around the perimeter defined by the dome spray water on an occupant of the chair. As a result, the occupant of the chair becomes wet. Further, although the chair folds up, the umbrella does not, thus precluding compact storage.

### **Summary of the Disclosure**

[0011] According to various embodiments, an umbrella incorporates a misting system to provide a curtain of mist substantially outside a user placement area within a perimeter defined by the umbrella, assuming substantially windless conditions. Misting nozzles project the curtain of mist downward and slightly radially outward relative to a central axis of the umbrella. The curtain of mist reduces heat transfer to the area covered by the umbrella from the ambient environment outside that area. In this way, persons sitting under the umbrella can enjoy cooler temperatures when the ambient environment is hot.

[0012] In one implementation, an umbrella includes a pole defining a substantially vertical axis. Spokes having first and second ends are operatively connected at respective first ends to the pole. The spokes are configurable between an open position and a closed position. An umbrella member is supported on the spokes. The umbrella member defines a perimeter when the spokes are configured in the open position. When the spokes are configured in the closed position, the umbrella member compactly fits around the pole. Misting nozzles are located proximate respective second ends of the spokes. The misting nozzles are coupled to tubes adapted to feed the misting nozzles when the tubes are coupled to a water source. The misting nozzles are directed to provide a curtain of mist substantially outside a user placement zone located within the perimeter defined by the umbrella member under substantially windless conditions when the spokes are configured in the open position and the tubes are coupled to the water source.

[0013] Another implementation is directed to a misting system for use with an umbrella supported on a plurality of spokes and defining a perimeter when the umbrella is opened. The misting system includes a fluid port adapted to be coupled to a water source. A manifold has an inlet in fluid communication with the

fluid port and has a plurality of outlets. Tubes are coupled to respective outlets and to misting nozzles. Each misting nozzle is adapted to be secured proximate an end of a respective spoke. The misting nozzles are directed to provide a curtain of mist substantially outside a user placement zone located within the perimeter under substantially windless conditions when the umbrella is opened and the fluid port is coupled to the water source.

[0014] Still another implementation is directed to a method of manufacturing an umbrella. A pole defining a substantially vertical axis is provided. A water conduit is provided within the pole. Spokes are operatively connected at respective first ends to the pole. An umbrella member is supported on the spokes so as to define a perimeter when the spokes are configured in an open position and to compactly fit around the pole when the spokes are configured in a closed position. A manifold is located proximate the first ends of the spokes. The manifold has an inlet in fluid communication with the water conduit and has a plurality of outlets. Misting nozzles are located proximate respective second ends of the spokes. The misting nozzles are directed to provide a curtain of mist substantially outside a user placement zone located within the perimeter defined by the umbrella member under substantially windless conditions when the spokes are configured in the open position and the tubes are coupled to a water source. Tubes are coupled to the outlets of the manifold and to the misting nozzles such that, when the water conduit is coupled to the water source and the spokes are configured in the open position, water is provided through the manifold and the tubes to the misting nozzles and emitted as the curtain of mist.

[0015] Various implementations may provide certain advantages. Because the misting nozzles project the curtain of mist outward relative to the central axis of the umbrella, the curtain of mist provides a cooling effect without causing persons sitting under the umbrella to become wet. Further, the misting system employs flexible tubing and can be easily and compactly stored, brought out of storage for a social occasion and placed on a patio table, and then removed following the occasion for compact storage.

[0016] Additional advantages and features will become apparent from the following description and the claims that follow, considered in conjunction with the accompanying drawings.

### **Brief Description of the Drawings**

[0017] Figure 1 is a side elevational view illustrating an umbrella according to one embodiment.

[0018] Figure 2 is a sectional view taken along line 2-2 of Figure 1 showing a portion of a misting system forming part of the umbrella.

[0019] Figure 3 is an exploded perspective view of the area shown in Figure 2.

[0020] Figure 4 is a sectional view taken along line 4-4 of Figure 1 showing another portion of the misting system.

[0021] Figure 5 is a sectional view taken along line 5-5 of Figure 1 showing another portion of the misting system.

[0022] Figure 6 is a sectional view illustrating an alternative embodiment of a manifold forming part of the umbrella.

[0023] Figure 7 is a perspective view of the manifold illustrated in Figure 6.

### **Detailed Description of Various Embodiments**

[0024] According to various embodiments, an umbrella incorporates a misting system to provide a curtain of mist substantially outside a user placement area within a perimeter defined by the umbrella, assuming substantially windless conditions. Misting nozzles project the curtain of mist downward and slightly radially outward relative to a central axis of the umbrella. The curtain of mist reduces heat transfer to the area covered by the umbrella from the ambient environment outside that area, thereby providing a cooling effect without causing persons sitting under the umbrella to become wet. The misting system employs flexible tubing and can be easily and compactly stored, brought out of storage for a social occasion and placed on a patio table, and then removed following the occasion for compact storage.

[0025] The following description of various embodiments implemented in a connection with a patio umbrella is to be construed by way of illustration rather than limitation. For example, while various embodiments are described as being implemented in a patio umbrella, it will be appreciated that the principles described herein are applicable to other types of umbrellas.

[0026] In the following description, numerous specific details are set forth in order to provide a thorough understanding of various embodiments. It will be apparent to one skilled in the art that such embodiments may be practiced without some or all of these specific details. In other instances, well known components and process steps have not been described in detail for purposes of clarity.

[0027] Referring now to the drawings, Figure 1 illustrates an umbrella 100 incorporating a misting system 102. A pole 104 defines a substantially vertical axis generally coincident with line 2-2. An umbrella member 106 is supported on spokes 108, each of which has an end connected to the pole 104 either directly or through intervening elements. The umbrella 100 may have any number of spokes 108. In the embodiment illustrated in Figure 1, the umbrella 100 has eight spokes 108, of which six are visible in Figure 1.

[0028] The spokes 108 can be moved to assume a closed position or an open position. In the closed position, the spokes 108 compactly fit around the pole 104. The umbrella member 106 is formed from a flexible material, such as fabric, and also compactly fits around the pole 104 when the spokes 108 are in the closed position. When the spokes 108 are moved to the open position illustrated in Figure 1, the umbrella member 106 spreads open. An outer edge 110 of the umbrella member 106 defines a perimeter. One or more users may sit or stand in or otherwise occupy a user placement zone within the perimeter defined by the umbrella member 106.

[0029] Misting nozzles 112 are located near ends of the spokes 108 along the perimeter defined by the umbrella member 106. The misting nozzles 112 are coupled to tubes 130, which may be fastened to the spokes 108, for example, using clips 132. The tubes feed the misting nozzles 112 when the tubes are coupled to a garden hose 114 or other water source. While not visible in Figure 1, the tubes are

in fluid communication with a water conduit 116 inside the pole 104. The water conduit 116 may be implemented as a hose that emerges from an aperture 118 near a lower end of the pole 104 and terminates in a fluid port 120. The fluid port 120 may incorporate a conventional screw-type connector to facilitate fluid coupling to a garden hose or other water source.

[0030] When the spokes 108 are in the open position and the tubes are coupled to the water source, water flows up the water conduit 116 and through the tubes and is atomized by the misting nozzles 112 to provide a curtain of mist. The misting nozzles 112 are oriented downward and slightly outward relative to the vertical axis defined by the pole 104. With this orientation, the misting nozzles 112 emit the curtain of mist substantially outside the user placement zone located within the perimeter defined by the umbrella member 106. For example, in the absence of wind, the curtain of mist may have a generally frustoconical shape with a top edge substantially coincident with the perimeter defined by the umbrella member 106. A bottom edge of the curtain of mist may lie just outside the perimeter.

[0031] It will be appreciated by those of skill in the art that wind conditions can alter the shape of the curtain of mist. The extent to which wind conditions affect the curtain of mist depend on wind speed, and may also depend on operating characteristics of the misting system 102. Such operating characteristics may include, *e.g.*, water pressure, which affects the velocity with which water droplets forming the curtain of mist exit the misting nozzles 112, the size of the water droplets, and the orientation of the misting nozzles 112. For example, large, heavy water droplets are less susceptible to wind conditions than small, light water droplets.

[0032] In some embodiments, an optional valve 122 may be employed to control the flow of water through the misting system 102. By adjusting the valve 122, a user can adjust the water pressure in the misting system 102, causing more or less mist to be emitted. In this way, the user can control the cooling level provided by the misting system 102. The misting system 102 may emit a thicker mist, for example, for use on particularly hot days. Less hot days may require less

of a cooling effect, and the valve 122 may be adjusted accordingly. If the valve 122 is omitted, water pressure can be adjusted at the water supply.

[0033] Figure 2 is a cross-sectional view taken along line 2-2 of Figure 1 and illustrates an upper portion of the umbrella 100 and misting system 102. As depicted in Figure 2, tubes 130 are secured to the spokes 108 via clips 132. The tubes 130 are formed of a flexible material so they do not interfere with movement of the spokes 108 between the open and closed positions. For example, the tubes 130 may be formed from rubber or flexible plastic. While not shown in Figure 2, one end of each tube 130 is connected to a corresponding misting nozzle 112.

[0034] The other end of each tube 130 is connected to a manifold 134, which is in turn connected to the water conduit 116. The water conduit 116 may be implemented, for example, as a hose that is inserted from a lower end of the pole 104 and subsequently connected to the manifold 134 via a nipple arrangement 136, screw-type connection, or other suitable interface. In some embodiments, the length of the pole 104 may be adjusted to vary the height of the umbrella 100, and the hose has a length sufficient to extend from the manifold 134 to the fluid port 120 when the umbrella 100 is at its maximum height. Accordingly, when the umbrella 100 is at less than its maximum height, a portion of the hose protrudes from an aperture near the lower end of the pole 104. As the height of the umbrella 100 is adjusted via a crank or other mechanism, the hose is free to move in and out of the aperture, which may have an oval or other suitable shape.

[0035] In some embodiments, the pole 104 may be divided into upper and lower portions. For example, as shown in Figure 2, an upper portion 138 of the pole 104 slides over a lower portion 140. The upper portion 138 may contain slots 142, through which the tubes 130 may be inserted and routed to corresponding spokes 108. A shoulder 144 supporting the spokes 108 may in turn be mounted on top of the upper portion 138. The slots 142 are sufficiently long that the shoulder 144 does not fully cover the slots 142 when the shoulder 144 is completely mounted on top of the upper portion 138.

[0036] To reduce the potential for interference with other components of the umbrella 100, the manifold 134 is preferably located relatively near the



shoulder 144. With the manifold 134 so located, the tubes 130 can be relatively short. As a result, entanglement with other components can be reduced or eliminated. In addition, consistent water pressure is promoted by keeping the length of the tubes 130 relatively short.

[0037] When water is supplied to the fluid port 120, *e.g.*, by coupling the fluid port 120 to a water source and activating the flow of water from the water source, water flows up the water conduit 116 and through the manifold 134. The manifold 134 distributes the flow of water substantially evenly among all of the tubes 130. Water then flows to the misting nozzles 112 and is emitted as a mist of water droplets. With the water flow as described, water pressure is substantially uniform among the misting nozzles 112. As a result, the shape of the curtain of mist can be relatively well controlled.

[0038] Figure 3 is an exploded perspective view of the area shown in Figure 2. The manifold 134 has an inlet 146, which may be implemented as a nipple, a threaded connector, or other suitable channel through which water can flow. The inlet 146 is configured to be connected to the water conduit 116. Outlets 148 are located on a top surface of the manifold 134. The outlets 148 preferably have relatively uniform dimensions so the water pressure at the outlets 148 is relatively uniform. While not shown in Figure 3, each outlet 148 is connected to a corresponding tube 130. When water flows into the inlet 146, the manifold 134 distributes the flow of water substantially uniformly among the outlets 148. Water flow through each tube 130 and to each misting nozzle 112 is relatively uniform as a result. With the tubes 130 connected to the outlets 148 in this way, the tubes 130 bear operating loads in a distributed or cooperative manner and reduce the likelihood of tubes 130 becoming disconnected or dislodged in operation.

[0039] Figure 4 is a cross-sectional view taken along line 4-4 of Figure 1 and illustrates one instantiation of a spoke 108, a misting nozzle 112, and a tube 130. As depicted in Figure 4, the tube 130 is fastened to the spoke 108 via a clip 132 and has one end connected to the misting nozzle 112. When the flow of water is activated, water is supplied through the fluid port 120 and the water conduit 116. The manifold 134 distributes the flow of water to the tube 130 at a water pressure

controlled in part by the optional valve 122. Water then flows to the misting nozzle 112 and is emitted as a fine mist of water droplets. Because the misting nozzle 112 is oriented downward and slightly outward relative to the vertical axis defined by the pole 104, the water droplets exit the misting nozzle 112 to form a curtain of mist substantially under the perimeter defined by the umbrella member 106, as indicated by the dashed lines in Figure 4.

[0040] In some embodiments, the height of the umbrella 100 is adjustable. Figure 5 is a cross-sectional view taken across line 5-5 of Figure 1 showing a lower portion of the umbrella 100 and misting system 102 implementing such an embodiment. As illustrated in Figure 5, a lower portion of the pole 104 defines an aperture 160 through which the water conduit 116 is free to move as the height of the umbrella 100 is adjusted. The aperture 160 may have any suitable shape to accommodate movement of the water conduit 116. For example, the aperture 160 may have an oval shape. The water conduit 116 is sufficiently long to accommodate raising the umbrella 100 to its full height. When the umbrella 100 is at less than its full height, a portion of the water conduit 116 protrudes from the aperture 160. When the umbrella 100 is lowered to its minimum height, for example, one meter or more of the water conduit 116 may protrude from the aperture 160.

[0041] Figures 6 and 7 illustrate an alternative implementation of the manifold 134. In this implementation, the manifold 134 has an inlet 150, which may be threaded to connect to the water conduit 116. The inlet 150 may also be implemented as a nipple or other suitable channel through which water can flow. Outlets 152 are spaced around an outer surface 154 of the manifold 134. The outlets 152 preferably have relatively uniform dimensions so the water pressure at the outlets 152 is relatively uniform. Each outlet 152 is connected to a corresponding tube 130.

[0042] When water flows into the inlet 150, the manifold 134 distributes the flow of water substantially uniformly among the outlets 152. Water flow through each tube 130 and to each misting nozzle 112 is relatively uniform as a result.

[0043]           The misting system 102 can be assembled as part of the process of manufacturing the umbrella 100. Alternatively, the misting system 102 can be implemented as an after-market kit that upgrades a conventional umbrella. Accordingly, various details of the misting system 102 can be modified to accommodate different umbrellas. A lesser or greater number of misting nozzles 112 and tubes 130 may be employed, for example, to accommodate umbrellas having different numbers of spokes.

[0044]           As demonstrated by the foregoing discussion, various implementations may provide certain advantages. For example, because the curtain of mist is projected outward relative to the central axis of the umbrella, it provides a cooling effect without causing persons sitting under the umbrella to become wet. Further, the misting system employs flexible tubing and can be easily and compactly stored, brought out of storage for a social occasion and placed on a patio table, and then removed following the occasion for compact storage.

[0045]           It will be understood by those skilled in the art that various modifications and improvements may be made without departing from the spirit and scope of the disclosed embodiments. The scope of protection afforded is to be determined solely by the claims and by the breadth of interpretation allowed by law.